Claims

1. A material having a volume resistivity at room temperature of not higher than 1×10^{13} Ω・cm, said material being composed of an aluminum nitride sintered body containing samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent, said sintered body containing aluminum nitride phase and samarium-aluminum complex oxide phase.

2. The material of claim 1, wherein said samarium-aluminum complex oxide phase contains $SmAl_{11}O_{18}$ phase.

3. The material of claim 1 or 2, wherein said sintered body comprises aluminum nitride grains having a mean diameter of not lower than 3 μm.

4. The material of claim 1 or 2, wherein the molar ratio of said converted content of samarium calculated as samarium oxide to an calculated content of aluminum oxide (Sm_2O_3 / Al_2O_3) is 0.05 to 0.5.

5. The material of claim 1 or 2, wherein said sintered body has an activation energy of temperature dependency of volume resistivity from room temperature to 300 ℃ of not higher than 0. 4 eV.

6. The material of claim 1, wherein said samarium-aluminum complex oxide phase forms network microstructure.

7. The material of claim 2, wherein said $SmAl_{11}O_{18}$ phase forms network microstructure.

8. The material of claim 1 or 2, wherein said sintered body has a lightness of not higher than N4 measured according to JIS Z8721.

9. The material of claim 1 or 2, wherein said sintered body contains one or more metal element selected from the group consisting of metal elements belonging to the periodic table IVA, VA, VIA, VIIA and VIIIA in a content

calculated as metal element of not lower than 0.01 weight percent.

10. The material of claim 1 or 2, wherein said sintered body contains at least one second rare earth element other than samarium, and wherein the molar ratio of a converted content of said second rare earth element calculated as rare earth oxide to said converted content of samarium calculated as samarium oxide (said converted content of said second rare earth element/said converted content of samarium) is not higher than 2.0.

11. The material of claim 10, wherein the molar ratio of total of converted contents of all the rare earth elements calculated as rare earth oxides to a calculated content of aluminum oxide (said total of converted contents of all the rare earth elements/said content of aluminum oxide) is 0.05 to 0.5.

12. An aluminum nitride sintered body containing samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent, said sintered body containing aluminum nitride phase and $SmAl_{11}O_{18}$ phase.

13. The sintered body of claim 12, wherein said $SmAl_{11}O_{18}$ phase forms network microstructure.

14. The sintered body of claim 12 or 13, having a volume resistivity at room temperature of not higher than 1×10^{13} Ω・cm.

15. The sintered body of claim 12, comprising at least one second rare earth element other than samarium, wherein the molar ratio of a converted content of said second rare earth element calculated as rare earth oxide to said converted content of samarium calculated as samarium oxide (said converted content of said second rare earth element/said converted content of samarium) is not higher than 2.0.

16. The sintered body of claim 15, wherein the molar ratio of total of converted contents of all the rare earth elements calculated as rare earth

oxides to a calculated content of aluminum oxide (said total of converted contents of all the rare earth elements/said content of aluminum oxide) is 0.05 to 0.5.

17. The sintered body of claim 15, wherein said second rare earth element is one or more element selected from the group consisting of yttrium, lanthanum, cerium, gadolinium, dysprosium, erbium and ytterbium.

18. The sintered body of claim 15, comprising phase of complex oxide of said second rare earth element and aluminum.

19. The sintered body of claim 12 comprising $SmAlO_3$ phase.

20. The sintered body of claim 12 comprising aluminum nitride grains with a mean diameter of not lower than 3 μm.

21. The sintered body of claim 12, wherein the molar ratio of said converted content of samarium calculated as samarium oxide to a calculated content of aluminum oxide(Sm_2O_3/Al_2O_3) is 0.05 to 0.5.

22. The sintered body of claim 12 having a lightness of not higher than N4 measured according to JIS Z8721.

23. The sintered body of claim 12 comprising one or more transition metal element selected from the group consisting of metal elements belonging to the periodic table IVA, VA, VIA, VIIA and VIIIA in a content calculated as metal element of not lower than 0.01 weight percent.

24. The sintered body of claim 23, comprising said transition metal element in a content calculated as metal element of not higher than 1.0 weight percent.

25. The sintered body of claim 23 comprising crystalline phase of the nitride of said transition metal element.

26. The sintered body of claim 12 having an activation energy of temperature dependency of volume resistivity from room temperature to

300℃ of not higher than 0. 4 eV.

27. An aluminum nitride sintered body containing samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent, said sintered body containing aluminum nitride phase and samarium-aluminum complex oxide phase with network microstructure.

28. The sintered body of claim 27, having a volume resistivity at room temperature of not higher than 1×10^{13} Ω · c m.

29. The sintered body of claim 27, wherein said samarium-aluminum complex oxide phase comprises $SmAl_{11}O_{18}$ phase with network microstructure.

30. The sintered body of claim 27, comprising at least one second rare earth element other than samarium, wherein the molar ratio of a converted content of said second rare earth element calculated as rare earth oxide to said converted content of samarium calculated as samarium oxide (said converted content of said second rare earth element/said converted content of samarium) is not higher than 2.0.

31. The sintered body of claim 30, wherein the molar ratio of total of converted contents of all the rare earth elements calculated as rare earth oxides to a calculated content of aluminum oxide (said total of converted contents of all the rare earth elements/said content of aluminum oxide) is 0.05 to 0.5.

32. The sintered body of claim 30, wherein said second rare earth element is one or more element selected from the group consisting of yttrium, lanthanum, cerium, gadolinium, dysprosium, erbium and ytterbium.

33. The sintered body of claim 30, comprising phase of complex oxide of said second rare earth element and aluminum.

34. The sintered body of claim 27 comprising $SmAlO_3$ phase.

35. The sintered body of claim 27 comprising aluminum nitride grains with a mean diameter of not lower than 3 μm.

36. The sintered body of claim 27, wherein the molar ratio of said converted content of samarium calculated as samarium oxide to a calculated content of aluminum oxide (Sm_2O_3 / Al_2O_3) is 0.05 to 0.5.

37. The sintered body of claim 27 having a lightness of not higher than N4 measured according to JIS Z8721.

38. The sintered body of claim 27 comprising one or more transition metal element selected from the group consisting of metal elements belonging to the periodic table IVA, VA, VIA, VIIA and VIIIA in a content calculated as metal element of not lower than 0.01 weight percent.

39. The sintered body of claim 38, comprising said transition metal element in a content calculated as metal element of not higher than 1.0 weight percent.

40. The sintered body of claim 38 comprising crystalline phase of the nitride of said transition metal element.

41. The sintered body of claim 27 having an activation energy of temperature dependency of volume resistivity from room temperature to 300°C of not higher than 0. 4 eV.

42. An aluminum nitride sintered body comprising samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent and at least one second rare earth element other than samarium, wherein the molar ratio of a converted content of said second rare earth element calculated as rare earth oxide to said converted content of samarium calculated as samarium oxide (said converted content of said second rare earth element/said converted content of samarium) is not higher than 2.0.

43. The sintered body of claim 42, wherein the molar ratio of total

of converted contents of all the rare earth elements calculated as rare earth oxides to a calculated content of aluminum oxide (said total of converted contents of all the rare earth elements/said content of aluminum oxide) is 0.05 to 0.5.

44. The sintered body of claim 42, wherein said second rare earth element is one or more element selected from the group consisting of yttrium, lanthanum, cerium, gadolinium, dysprosium, erbium and ytterbium.

45. The sintered body of claim 42, comprising phase of complex oxide of said second rare earth element and aluminum.

46. The sintered body of claim 42, comprising aluminum nitride phase and samarium-aluminum complex oxide phase.

47. The sintered body of claim 46, wherein said samarium-aluminum complex oxide phase comprises $SmAl_{11}O_{18}$ phase.

48. The sintered body of claim 46, wherein said samarium-aluminum complex oxide phase forms network microstructure.

49. The sintered body of claim 42, having a volume resistivity at room temperature of not higher than 1×10^{13} Ω・cm.

50. The sintered body of claim 42 comprising $SmAlO_3$ phase.

51. The sintered body of claim 42 comprising aluminum nitride grains with a mean diameter of not lower than 3 μm.

52. The sintered body of claim 42, wherein the molar ratio of said converted content of samarium calculated as samarium oxide to a calculated content of aluminum oxide(Sm_2O_3/ Al_2O_3) is 0.05 to 0.5.

53. The sintered body of claim 42 having a lightness of not higher than N4 measured according to JIS Z8721.

54. The sintered body of claim 42 comprising one or more transition metal element selected from the group consisting of metal elements belonging

to the periodic table IVA, VA, VIA, VIIA and VIIIA in a content calculated as metal element of not lower than 0.01 weight percent.

55. The sintered body of claim 54, comprising said transition metal element in a content calculated as metal element of not higher than 1.0 weight percent.

56. The sintered body of claim 54 comprising crystalline phase of the nitride of said transition metal element.

57. The sintered body of claim 42 having an activation energy of temperature dependency of volume resistivity from room temperature to 300℃ of not higher than 0. 4 eV.

58. A member used for the production of semiconductors, wherein at least a part of said member is made of an aluminum nitride sintered body containing samarium.

59. The member of claim 58, wherein said sintered body has a volume resistivity at room temperature of not lower than 1×10^{8} Ω・cm and not higher than 1×10^{13} Ω・cm.

60. The member of claim 58, wherein said sintered body contains samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent and aluminum nitride phase and samarium-aluminum complex oxide phase.

61. The member of claim 60, wherein said samarium-aluminum complex oxide phase comprises $SmAl_{11}O_{18}$ phase.

62. The member of claim 60, wherein said samarium-aluminum complex oxide phase forms network microstructure.

63. The member of claim 58, wherein said aluminum nitride sintered body contains samarium in a converted content calculated as samarium oxide of not lower than 0.04 mole percent and at least one second

rare earth element other than samarium, and wherein the molar ratio of a converted content of said second rare earth element calculated as rare earth oxide to said converted content of samarium calculated as samarium oxide (said converted content of said second rare earth element/said converted content of samarium) is not higher than 2.0.

64. The member of claim 63, wherein the molar ratio of total of converted contents of all the rare earth elements calculated as rare earth oxides to a calculated content of aluminum oxide (said total of converted contents of all the rare earth elements/said content of aluminum oxide) is 0.05 to 0.5.

65. The member of claim 63, wherein said second rare earth element is one or more element selected from the group consisting of yttrium, lanthanum, cerium, gadolinium, dysprosium, erbium and ytterbium.

66. The member of claim 63 containing crystalline phase of complex oxide of said second rare earth element and aluminum.

67. The member of claim 58, wherein said sintered body contains aluminum nitride grains with a mean diameter of not lower than 3 μm.

68. The member of claim 58, wherein the molar ratio of said converted content of samarium calculated as samarium oxide to a calculated content of aluminum oxide(Sm_2O_3/ Al_2O_3) is 0.05 to 0.5.

69. The member of claim 58, wherein said sintered body has an activation energy of temperature dependency of volume resistivity from room temperature to 300 ℃ of not higher than 0. 4 eV.

70. The member of claim 58, comprising a substrate made of said aluminum nitride sintered body and a metal member embedded in said substrate.

71. The member of claim 70, wherein said metal member comprises at least an electrode for an electrostatic chuck.

72. The member of claim 58, wherein said sintered body has a lightness of not higher than N4 measured according to JIS Z8721.

73. The member of claim 58, wherein said sintered body contains one or more transition metal element selected from the group consisting of metal elements belonging to the periodic table IVA, VA, VIA, VIIA and VIIIA in a content calculated as metal element of not lower than 0.01 weight percent.

74. The member of claim 73, wherein said sintered body contains said transition metal element in a content calculated as metal element of not higher than 1.0 weight percent.

75. The member of claim 73, wherein said sintered body contains crystalline phase of the nitride of said transition metal element.